

## EVALUATION OF CONSTRUCTION MATERIALS

To ensure that construction materials meet job requirements, their quality must be evaluated in relation to applicable specifications. The nature, time, and place of this evaluation depend on the kind of material, the specifications, the kind of construction, and other factors. Policy on the Evaluation of Construction Materials is found in part 512 of the National Engineering Manual (NEM). Construction material quality is to be evaluated by at least one of the following procedures:

1. Laboratory testing by NRCS, by a consulting firm or commercial laboratory under contract with NRCS, or by another government agency.
2. Testing by a consulting firm or commercial laboratory employed by the manufacturer under approved conditions.
3. Certification in writing from the manufacturer providing salient features and test results showing compliance with specifications and stating that the material complies with the applicable specification.
4. Markings on material that identify the manufacturer and indicate compliance with the appropriate ASTM specification. Laboratory tests and current test reports are to be supplied on request.
5. Examination and/or testing at the job site.
6. Pre-approved status (hydrophilic water stops for use with liquid manure and ag waste tanks).

Verification that materials meet specifications for conservation practices will generally be by field measurement and inspection and identification of markings. The following procedure should be used by field personnel for identification and acceptance of these materials.

### Corrugated Plastic Drain Tubing

The following procedure should be used by field personnel for identification and acceptance of corrugated plastic drainage tubing:

#### Polyethylene (PE) Tubing:

1. Check marking on the tubing. Polyethylene tubing shall include the identification symbol of the manufacturer, the ASTM number "ASTM F 405" for 3 to 6 inch diameter tubing or "ASTM F 667" for 8 to 24 inch diameter tubing, and the designation for standard (S) or heavy duty (H) (for ASTM F 405 tubing only) regularly spaced at intervals not exceeding 10 feet (3m).

If the tubing is marked AASHTO M-252 for 3 to 10 inch diameter or AASHTO M-294 for larger diameter, the tubing exceeds the requirement of ASTM F 405 or F 667.

2. Dating. Each roll or bundle shall bear the day, month, and year of manufacture. This may be embossed on the product or added on a tag. The date should be recorded and become a part of the practice documentation records.
3. Fittings shall be marked with the appropriate ASTM or AASHTO identification symbol.

## CORRUGATED METAL PIPE

Materials for corrugated metal pipe (CMP) products shall be marked according to the following ASTM designations:

<u>MATERIAL</u>	<u>ASTM DESIGNATION</u>
Steel Sheet, Metallic-Coated	A 929
Steel Sheet, Zinc and Aramid Fiber Composite Coated	A 885
Steel Sheet, Metallic Coated and Polymer Precoated	A 742
Post-Coated and Lined Corrugated Steel Sewer and Drainage Pipe (Bituminous or Concrete)	A 849
Aluminum Alloy Sheet	B 744

Post-coated and lined pipes require manufacturer's certification because they are not marked.

The evaluation and acceptance of close or double riveted pipe, caulked seam pipe, and fabricated appurtenances such as anti-seep diaphragms is based on measurements and inspection of the product.

The pipe should be examined to insure that the material meets the required ASTM standard(s) and that the fabrication and condition of the pipe meets specifications.

## SMOOTH PLASTIC PIPE

Plastic piping materials shall have legible markings placed on the pipe by the manufacturer. The ASTM or AASHTO Specifications state the markings required. Proper markings may be accepted as proof of quality when supported by visual inspection and measurements confirming that the pipe is in accordance with NRCS plans and specifications.

The types of plastic pipe used in NRCS conservation practices include:

- |  |             |
|--|-------------|
| a. Polyvinyl chloride (PVC)              |             |
| Schedules 40, 80 and 120                 | ASTM D 1785 |
| SDR Series                               | ASTM D 2241 |
| b. Acrylonitrile-Butadiene-Styrene (ABS) |             |
| Schedules 40 and 80                      | ASTM D 1527 |
| c. Polyethylene (PE)                     |             |
| Schedules 40 and 80                      | ASTM D 2447 |
| SIDR                                     | ASTM D 2239 |

More details concerning the markings, the meaning of the wordings, and the product can be found in the ASTM's.

All piping material not properly marked, should be rejected unless the manufacturer provides written certification or test results.

### STEEL REINFORCEMENT FOR CONCRETE

Reinforcing steel shall be evaluated based on the standard identification markings on the steel:

- Type of steel:  
ASTM A 615, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement" is the most common type of reinforcement bars used. A raised S marking on the bar indicates this.
- Grade of steel:  
The grade of steel represents the minimum yield strength of the bar. For example, Grade 40 represents minimum yield strength of 40,000 psi.
- As a general rule, a higher grade of steel should not be substituted for lower grades. This is more of a concern with heavily reinforced sections. With any proposed substitution, both the steel ratio and splice length would have to be analyzed.
- Bar Sizes:  
The standard bar sizes #3 through #18 are deformed bars. The number of the bar designates the diameter in terms of multiples of 1/8 inch. For example #5 equals 5/8-inch diameter. This designation is consistent for #3 through #9. Bars designated by numbers larger than #9 have diameters slightly exceeding the norm represented by the 1/8-inch size increment.
- Bar Identification:  
ASTM specifications require that each bar producer shall roll onto the bar:
  - (a) a letter or symbol to show the producer's mill,
  - (b) a number corresponding to the size number of the bar,
  - (c) a symbol or marking to indicate the type of steel, and
  - (d) a marking to designate grade 60 and grade 75 (grade 40 bars do not have a grade mark).

The following page shows information and markings for steel reinforcement bars.

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